

Claims

What is claimed is:

1. A fuel pumping system, comprising:
a pump drive;
a first pumping element operatively connected to the pump drive and operable to generate a first flow of pressurized fuel;
a second pumping element operatively connected to the pump drive and operable to generate a second flow of pressurized fuel;
a first solenoid operatively connected to the first pumping element and operable to vary at least one of a fuel pressure and a fuel flow rate of the first flow of pressurized fuel; and
a second solenoid operatively connected to the second pumping element and operable to vary at least one of a fuel pressure and a fuel flow rate of the second flow of pressurized fuel.
2. The fuel pumping system of claim 1, further including a controller operable to control the first and second solenoids to vary at least one of the fuel pressure and fuel flow rate of the first and second flows of pressurized fuel.
3. The fuel pumping element of claim 1, wherein each of the first and second pumping elements includes a series of pistons.
4. The fuel pumping system of claim 1, further including a common manifold, and wherein the first and second pumping elements are connected to the common manifold in parallel.

5. The fuel pumping system of claim 1, further including:
a first manifold in fluid communication with the first pumping element; and
a second manifold in fluid communication with the second pumping element.

6. A method of controlling a fuel system, comprising:
operating a first pumping element to produce a first flow of pressurized fuel;
operating a second pumping element to produce a second flow of pressurized fuel;
selectively energizing a first solenoid to vary at least one of a fuel pressure and a fuel flow rate of the first flow of pressurized fuel;
selectively energizing a second solenoid to vary at least one of a fuel pressure and a fuel flow rate of the second flow of pressurized fuel; and
directing the first and second flows of pressurized fuel to a fuel injection system associated with a combustion chamber.

7. The method of claim 6, further including combining the first and second flows of pressurized fuel for injection into the combustion chamber.

8. The method of claim 6, further including:
directing the first flow of pressurized fuel through a first manifold to a fuel injection unit; and
directing the second flow of pressurized fuel through a second manifold to the fuel injection unit.

9. The method of claim 8, further including operating the fuel injection unit to selectively inject the first and second flows of pressurized fuel into the combustion chamber.

10. The method of claim 6, further including;
directing the first flow of pressurized fuel through a first manifold to a first fuel injection unit associated with the combustion chamber;
directing the second flow of pressurized fuel through a second manifold to a second fuel injection unit associated with the combustion chamber;
and
actuating at least one of the first and second fuel injection units to inject one of the first and second flows of pressurized fuel into the combustion chamber.

11. A fuel pumping system for an engine having at least one combustion chamber, comprising:
a fuel injection system associated with the at least one combustion chamber, the fuel injection system operable to inject an amount of pressurized fuel into the combustion chamber;
a first manifold in fluid communication with the fuel injection system;
a second manifold in fluid communication with the fuel injection system;
a first pumping element adapted to direct a first flow of pressurized fuel through the first manifold to the fuel injection system; and
a second pumping element adapted to direct a second flow of pressurized fuel through the second manifold to the fuel injection system.

12. The fuel pumping system of claim 11, wherein the fuel injection system includes a fuel injection unit adapted to selectively inject one of the first and second flows of pressurized fuel into the combustion chamber.

13. The fuel pumping system of claim 11, wherein the fuel injection system includes:

a first fuel injection unit in fluid communication with the first manifold; and

a second fuel injection unit in fluid communication with the second manifold.

14. An engine system, comprising:

an engine block defining at least one combustion chamber;

a pump drive;

a first pumping element operatively connected to the pump drive and operable to produce a first flow of pressurized fuel;

a second pumping element operatively connected to the pump drive and operable to produce a second flow of pressurized fuel;

a first solenoid operatively connected to the first pumping element and operable to vary at least one of a fuel pressure and a fuel flow rate of the first flow of pressurized fuel;

a second solenoid operatively connected to the second pumping element and operable to vary at least one of a fuel pressure and a fuel flow rate of the second flow of pressurized fuel; and

a fuel injection system operable to selectively inject the first and second flows of pressurized fuel into the at least one combustion chamber.

15. The engine system of claim 14, wherein each of the first and second pumping elements include a series of pistons.

16. The engine system of claim 14, further including a common manifold in fluid communication with the fuel injection system and wherein the first and second pumping elements are connected to the common manifold in parallel.

17. The engine system of claim 14, wherein the fuel injection system includes a fuel injection unit adapted to selectively inject one of the first and second flows of pressurized fuel into the at least one combustion chamber.

18. The engine system of claim 14, further including:
a first manifold providing fluid communication between the first pumping element and the fuel injection system; and
a second manifold providing fluid communication between the second pumping element and the fuel injection system.

19. The engine system of claim 18, wherein the fuel injection system includes:
a first fuel injection unit in fluid communication with the first manifold; and
a second fuel injection unit in fluid communication with the second manifold.

20. The engine system of claim 14, wherein the first and second pumping elements are disposed in first and second pumping housings, respectively.